```
e e4+all
E1          0   BT2   D Chemicals and Drugs/CT
E2        811    BT1   Organic Chemicals/CT
E3       1047     -->   Glycosylation End Products, Advanced/CT
E4       1047     MN    D2.415./CT
                   DC    an INDEX MEDICUS major descriptor
                   NOTE  Products derived from the nonenzymatic reaction of
                         glucose and proteins invivo that exhibit a
                         yellow-brown pigmentation and an ability to
                         participate in protein-protein cross-linking. These
                         substances are involved in biological processes
                         relating to protein turnover and it is believed that
                         their excessive accumulation contributes to the
                         chronic complications of diabetes mellitus.
                   INDX  DF: GEPA
                   AQ    AD AE AG AI AN BI BL CF CH CL CS CT DF DU EC GE HI
                         IM IP ME PD PH PK PO RESD SE ST TO TU UR
                   PNTE  Glycosylation (1988-1992)
                   HNTE  93
                   MHTH  NLM (1993)
E5          0      UF    Advanced Glycation End Products/CT
E6          0      UF    Advanced Glycosylation End Products/CT
E7          0      UF    GEPA/CT
E8          0      UF    Glycation End Products, Advanced/CT
********* END***
```

From Medline

```
 e e19+all
E1            0    -->   Histone H1/CT
E2        12880     USE    Histones/CT
*********  END***

=> e e2+all
E1            0    BT4    D Chemicals and Drugs/CT
E2            0     BT3    Amino Acids, Peptides, and Proteins/CT
E3       108832      BT2    Proteins/CT
E4        20219       BT1    Nuclear Proteins/CT
E5            0    BT4    D Chemicals and Drugs/CT
E6            0     BT3    Amino Acids, Peptides, and Proteins/CT
E7       108832      BT2    Proteins/CT
E8         6332       BT1    Nucleoproteins/CT
E9        12880        -->    Histones/CT
E10       12880        MN     D12.776.660.470./CT
E11       12880        MN     D12.776.664.469./CT
                        DC     an INDEX MEDICUS major descriptor
                        NOTE   Small chromosomal proteins (approx 12-20 kD)
                               possessing an open, unfolded structure and
                               attached to the DNA in cell nuclei by ionic
                               linkages.  Classification into the various types
                               (designated histone I, histone II, etc.) isbased
                               on the relative amounts of arginine and lysine in
                               each.
                        INDX   H1, H2a, H2b, H3, etc. go here
                        AQ     AD AE AG AI AN BI BL CF CH CL CS CT DE DF DU EC GE
                               HI IM IP ME PD PH PK PORE SD SE ST TO TU UL UR
                        MHTH   NLM (1966)
E12           0         UF     Histone/CT
E13           0         UF     Histone H1/CT
E14           0         UF     Histone H1(s)/CT
E15           0         UF     Histone H2a/CT
E16           0         UF     Histone H2b/CT
E17           0         UF     Histone H3/CT
E18           0         UF     Histone H3.3/CT
E19           0         UF     Histone H4/CT
E20           0         UF     Histone H5/CT
E21           0         UF     Histone H7/CT
*********  END***
```

From Medline

Point of Contact:
Jan Delaval
Librarian-Physical Sciences
CM1 1E04 Tel: 308-4403

```
=> fil reg
FILE 'REGISTRY' ENTERED AT 14:33:43 ON 19 DEC 2001
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STRUCTURE FILE UPDATES:   18 DEC 2001  HIGHEST RN 376576-00-0
DICTIONARY FILE UPDATES:  18 DEC 2001  HIGHEST RN 376576-00-0

TSCA INFORMATION NOW CURRENT THROUGH July 7, 2001

  Please note that search-term pricing does apply when
  conducting SmartSELECT searches.

Crossover limits have been increased.  See HELP CROSSOVER for details.

Calculated physical property data is now available.  See HELP PROPERTIES
for more information.  See STNote 27, Searching Properties in the CAS
Registry File, for complete details:
http://www.cas.org/ONLINE/STN/STNOTES/stnotes27.pdf

=> d ide can tot

L60  ANSWER 1 OF 5  REGISTRY  COPYRIGHT 2001 ACS
RN   68414-18-6  REGISTRY
CN   Adenosine 5'-(trihydrogen diphosphate), P'.fwdarw.5-ester with D-ribose,
     monosodium salt (9CI)  (CA INDEX NAME)
FS   STEREOSEARCH
MF   C15 H23 N5 O14 P2 . Na
LC   STN Files:   CA, CAPLUS, CHEMCATS, CSCHEM
CRN  (20762-30-5)

Absolute stereochemistry.
```

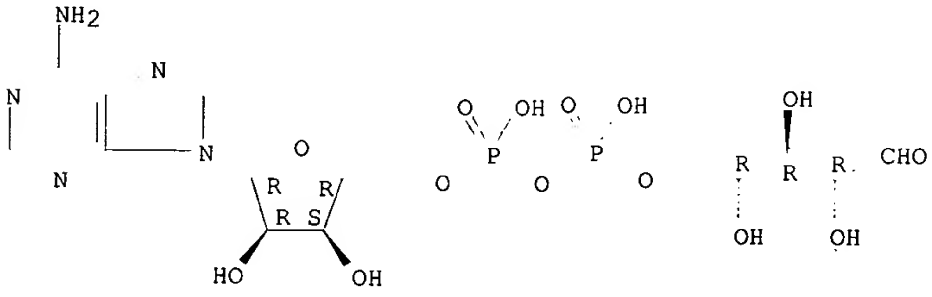


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              2 REFERENCES IN FILE CAPLUS (1967 TO DATE)

REFERENCE   1:  100:188283

REFERENCE   2:  89:210588

L60  ANSWER 2 OF 5  REGISTRY  COPYRIGHT 2001 ACS
RN   32391-12-1  REGISTRY
CN   Adenosine 5'-(trihydrogen diphosphate), P'.fwdarw.5-ester with D-ribose,
     sodium salt (9CI)  (CA INDEX NAME)
FS   STEREOSEARCH
MF   C15 H23 N5 O14 P2 . x Na
CRN  (20762-30-5)
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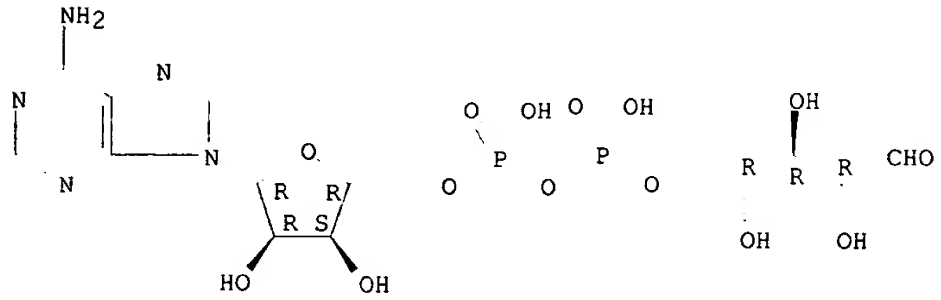
Absolute stereochemistry.



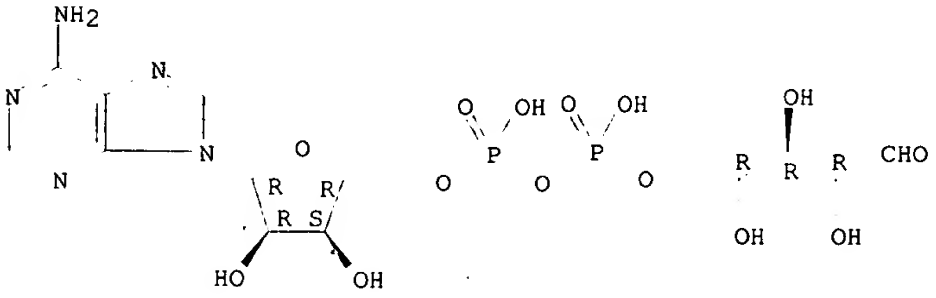
●x Na

L60 ANSWER 3 OF 5 REGISTRY COPYRIGHT 2001 ACS
RN 26656-46-2 REGISTRY
CN Adenosine 5'-(trihydrogen diphosphate), P'.fwdarw.5-ester with D-ribose, homopolymer (9CI) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN Adenosine 5'-(trihydrogen pyrophosphate), 5'.fwdarw.5-ester with .beta.-D-ribofuranose, polymers (8CI)
OTHER NAMES:
CN Adenosine diphosphate ribose polymers
CN Oligo(ADP-ribose)
CN Poly(adenosine diphosphate ribose)
CN Poly(adenosine diphosphoribose)
CN Poly(ADP ribose)
FS STEREOSEARCH
DR 25822-80-4, 29131-83-7
MF (C15 H23 N5 O14 P2)x
CI PMS
PCT Polyamine, Polyazomethine, Polyazomethine formed
LC STN Files: AGRICOLA, ANABSTR, BIOBUSINESS, BIOSIS, BIOTECHNO, CA, CANCERLIT, CAPLUS, CHEMCATS, CIN, EMBASE, MEDLINE, TOXCENTER, TOXLIT

CM 1

CRN 20762-30-5
CMF C15 H23 N5 O14 P2

Absolute stereochemistry.



691 REFERENCES IN FILE CA (1967 TO DATE)
26 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
691 REFERENCES IN FILE CAPLUS (1967 TO DATE)

REFERENCE 1: 135:238093

REFERENCE 2: 135:133331

REFERENCE 3: 134:362108

REFERENCE 4: 134:337621

REFERENCE 5: 134:263841

REFERENCE 6: 134:260974

REFERENCE 7: 134:233287

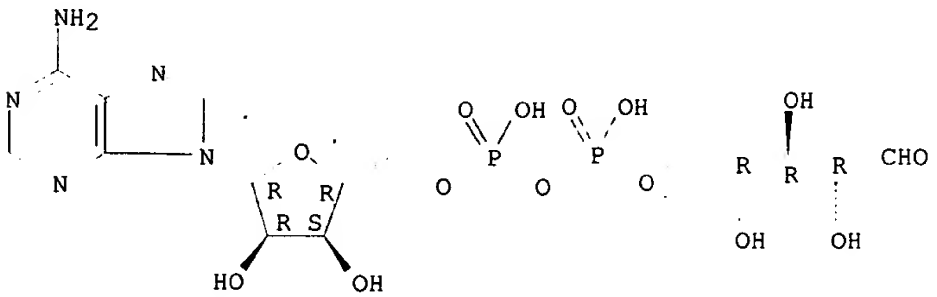
REFERENCE 8: 134:218817

REFERENCE 9: 134:218580

REFERENCE 10: 134:159330

L60 ANSWER 4 OF 5 REGISTRY COPYRIGHT 2001 ACS
RN **20762-30-5** REGISTRY
CN Adenosine 5'-(trihydrogen diphosphate), P'.fwdarw.5-ester with D-ribose (9CI) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN Adenosine 5'-(trihydrogen pyrophosphate), 5'.fwdarw.5-ester with D-ribofuranose (8CI)
CN Adenosine 5'-diphosphate, D-ribose ester (6CI)
CN Adenosine 5'-pyrophosphate, 5'.fwdarw.5-ester with D-ribofuranose (7CI)
CN Ribofuranose, 5.fwdarw.5'-ester with adenosine 5'-(trihydrogen pyrophosphate), D- (8CI)
OTHER NAMES:
CN 5-(Adenosine 5'-pyrophosphoryl)-D-ribose
CN Adenosine 5'-diphosphoribose
CN Adenosine diphosphate ribose
CN Adenosine diphosphoribose
CN Adenosine pyrophosphate-ribose
CN ADP ribose
CN ADPR
CN ADPR (nucleotide)
CN Ribose adenosinediphosphate
FS STEREOSEARCH
DR 10418-12-9, 86-06-6, 21090-17-5, 2140-57-0, 26635-72-3, 27576-48-3, 28115-73-3, 29352-45-2
MF C15 H23 N5 O14 P2
CI COM
LC STN Files: ADISNEWS, AGRICOLA, ANABSTR, BEILSTEIN*, BIOBUSINESS, BIOSIS, BIOTECHNO, CA, CANCERLIT, CAOLD, CAPLUS, CIN, EMBASE, IFICDB, IFIPAT, IFIUDB, MEDLINE, NIOSHTIC, TOXCENTER, TOXLIT, USPATFULL
(*File contains numerically searchable property data)

Absolute stereochemistry.



**PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT**

553 REFERENCES IN FILE CA (1967 TO DATE)
40 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
553 REFERENCES IN FILE CAPLUS (1967 TO DATE)
11 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 135:327370

REFERENCE 2: 135:327326

REFERENCE 3: 135:302851

REFERENCE 4: 135:287494

REFERENCE 5: 135:239080

REFERENCE 6: 135:150356

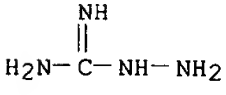
REFERENCE 7: 135:88666

REFERENCE 8: 135:57719

REFERENCE 9: 135:42585

REFERENCE 10: 135:30708

L60 ANSWER 5 OF 5 REGISTRY COPYRIGHT 2001 ACS
RN 79-17-4 REGISTRY
CN Hydrazinecarboximidamide (9CI) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN Guanidine, amino- (8CI)
OTHER NAMES:
CN Aminate base
CN **Aminoguanidine**
CN Carbamimidic acid, hydrazide
CN Guanylhydrazine
CN Monoaminoguanidine
CN Pimagedine
FS 3D CONCORD
DR 10331-66-5, 146396-78-3
MF C H6 N4
CI COM
LC STN Files: ADISINSIGHT, ADISNEWS, AGRICOLA, ANABSTR, BEILSTEIN*, BIOBUSINESS, BIOSIS, BIOTECHNO, CA, CANCERLIT, CAOLD, CAPLUS, CASREACT, CBNB, CHEMINFORMRX, CHEMLIST, CIN, DDFU, DRUGNL, DRUGU, DRUGUPDATES, EMBASE, GMELIN*, HODOC*, IFICDB, IFIPAT, IFIUDB, IPA, MEDLINE, MRCK*, NIOSHTIC, PHAR, PROMT, RTECS*, SPECINFO, SYNTHLINE, TOXCENTER, TOXLIT, USAN, USPATFULL, VETU
(*File contains numerically searchable property data)
Other Sources: EINECS**, WHO
(**Enter CHEMLIST File for up-to-date regulatory information)



**PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT**

990 REFERENCES IN FILE CA (1967 TO DATE)
55 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
992 REFERENCES IN FILE CAPLUS (1967 TO DATE)
14 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 135:366457

REFERENCE 2: 135:355724

REFERENCE 3: 135:338859

REFERENCE 4: 135:328708

REFERENCE 5: 135:327370

REFERENCE 6: 135:327326

REFERENCE 7: 135:315960

REFERENCE 8: 135:313625

REFERENCE 9: 135:313423

REFERENCE 10: 135:313351

=> fil hcaplus
FILE 'HCAPLUS' ENTERED AT 14:33:52 ON 19 DEC 2001
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FILE COVERS 1907 - 19 Dec 2001 VOL 135 ISS 26
FILE LAST UPDATED: 18 Dec 2001 (20011218/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

This file supports REG1stRY for direct browsing and searching of all substance data from the REGISTRY file. Enter HELP FIRST for more information.

HCAplus now provides online access to patents and literature covered in CA from 1907 to the present. Bibliographic information and abstracts were added in 2001 for over 3.8 million records from 1907-1966.

CAS roles have been modified effective December 16, 2001. Please check your SDI profiles to see if they need to be revised. For information on CAS roles, enter HELP ROLES at an arrow prompt or use the CAS Roles thesaurus (/RL field) in this file.

=> d all tot l59

L59 ANSWER 1 OF 8 HCAPLUS COPYRIGHT 2001 ACS
AN 2001:781247 HCAPLUS
DN 135:327326
TI Method for identifying regulators of **protein-advanced glycation end product** (**protein**-AGE) formation
IN **Jacobson, Elaine L.; Jacobson, Myron K.; Wondrak, Georg Thomas**
PA Niadyne Corporation, USA; University of Kentucky

SO PCT Int. Appl., 50 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM G01N033-50
CC 1-1 (Pharmacology)
FAN.CNT 1

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|
| PI WO 2001079842 | A2 | 20011025 | WO 2001-US12368 | 20010416 |

W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

PRAI US 2000-197829 P 20000414

AB Methods are provided for identifying compds. which affect cellular stress. In particular, the method provides methods for identifying compds. which inhibit **protein-advanced glycation end product** formation, where the compds. are carbonyl scavengers which inhibit the formation. The assay involves combining the substance of interest with **histone H1** and **ADP -ribose**, and then measuring fluorescence and **protein** crosslinking. Various inhibitors of **protein**-AGE **glycation** have been identified using this assay.

ST protein AGE formation inhibitor carbonyl scavenger identification

IT **Glycoproteins, specific or class**
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(**AGE (advanced glycosylation end product); protein-advanced glycation end product** formation regulator identification)

IT Fibroblast
(CF-3; **protein-advanced glycation end product** formation regulator identification)

IT **Histones**
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(**H1; protein-advanced glycation end product** formation regulator identification)

IT Dicarbonyl compounds
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(dicarbonyl scavengers; **protein-advanced glycation end product** formation regulator identification)

IT Scavengers
(dicarbonyl; **protein-advanced glycation end product** formation regulator identification)

IT Crosslinking
(**histone H1; protein-advanced glycation end product** formation regulator identification)

IT Skin
(keratinocyte, He-cat; **protein-advanced glycation end product** formation regulator identification)

IT Cytoprotective agents
Drug screening
Fluorometry
**Glycation**
Nucleophiles
Test kits
(**protein-advanced glycation end**

**product** formation regulator identification)

IT Thiols (organic), biological studies
RL: BAC (Biological activity or effector, except adverse); BIOL (Biological study)
(**protein-advanced glycation end product** formation regulator identification)

IT **Proteins**, general, biological studies
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(**protein-advanced glycation end product** formation regulator identification)

IT **Glycoproteins**, general, biological studies
RL: BPR (Biological process); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); PROC (Process)
(**protein-advanced glycation end product** formation regulator identification)

IT Albumins, biological studies
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(serum, AGE-BSA; **protein-advanced glycation end product** formation regulator identification)

IT 50-69-1, Ribose 50-99-7, D-Glucose, biological studies 52-66-4, D,L-Penicillamine 52-90-4, L-Cysteine, biological studies 56-41-7, L-Alanine, biological studies 58-68-4, NADH 60-23-1, Cysteamine 62-56-6, Thiourea, biological studies 67-43-6, DTPA 70-18-8, Glutathione, biological studies 74-79-3, L-Arginine, biological studies **79-17-4, Aminoguanidine** 87-78-5, Mannitol 107-95-9, .beta.-Alanine 153-18-4, Rutin 454-29-5, Homocysteine 497-30-3, L-Ergothioneine 504-17-6, 2-Thiobarbituric acid 616-91-1, N-Acetylcysteine 2140-58-1, ADP-glucose 2485-62-3, L-Cysteine methyl ester 9001-05-2, Catalase 19246-18-5
RL: BAC (Biological activity or effector, except adverse); BIOL (Biological study)
(**protein-advanced glycation end product** formation regulator identification)

IT 52-67-5, D-Penicillamine
RL: BAC (Biological activity or effector, except adverse); RCT (Reactant); BIOL (Biological study)
(**protein-advanced glycation end product** formation regulator identification)

IT 122-78-1, Phenylacetaldehyde **20762-30-5, ADP-ribose**
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(**protein-advanced glycation end product** formation regulator identification)

IT 78-98-8, Methylglyoxal 1074-12-0, Phenylglyoxal
RL: RCT (Reactant)
(**protein-advanced glycation end product** formation regulator identification)

IT 369372-93-0P 369372-94-1P
RL: SPN (Synthetic preparation); PREP (Preparation)
(**protein-advanced glycation end product** formation regulator identification)

L59 ANSWER 2 OF 8 HCAPLUS COPYRIGHT 2001 ACS
AN 2001:780677 HCAPLUS
DN 135:327370
TI Methods of use of penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivatives for the treatment of conditions resulting from DNA, protein, or lipid damage
IN **Jacobson, Myron K.; Jacobson, Elaine L.; Wondrak, Georg T.**; Cervantes-Laurean, Daniel
PA Niadyne Corporation, USA; University of Kentucky Research Foundation
SO PCT Int. Appl., 39 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM A61K031-198

CC 1-12 (Pharmacology)
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | WO 2001078718 | A1 | 20011025 | WO 2001-US12325 | 20010416 |
| | W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | | | | |
| | RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG | | | | |
| | US 2001051658 | A1 | 20011213 | US 2001-836552 | 20010416 |
| PRAI | US 2000-197216 | P | 20000414 | | |

AB Methods are disclosed for inhibiting damage to proteins, lipids, and DNA by the use of penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane compds. as dicarbonyl scavengers.

ST penicillamine dicarbonyl scavenger therapeutic DNA protein lipid damage; aminomercaptodimethylethane deriv dicarbonyl scavenger therapeutic DNA protein lipid damage

IT **Glycoproteins, specific or class**
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(**AGE (advanced glycosylation end product**); penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, **protein**, or lipid damage)

IT Collagens, biological studies
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(AGE-collagen; penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT Fibroblast
(CF3; penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT **Histones**
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(**H1**; penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT DNA
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(cleavage; penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT Scavengers
(dicarbonyl; penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT Albumins, biological studies
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(glycoalbumins, AGE-BSA; penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT Skin
(keratinocyte, HaCat; penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT UV A radiation
UV B radiation
(penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT Dicarbonyl compounds

RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT Skin, disease
(photoaging; penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT DNA
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(phototoxicity to; penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT Solar radiation
(solar-simulated light; penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT Phototoxicity
(to DNA; penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT 52-90-4, L-Cysteine, biological studies 58-68-4, NADH 60-23-1, Cysteamine 62-56-6, Thiourea, biological studies 70-18-8, Glutathione, biological studies **79-17-4, Aminoguanidine** 153-18-4, Rutin 454-29-5, Homocysteine 497-30-3, L-Ergothioneine 504-17-6, 2-Thiobarbituric acid 616-91-1, N-Acetylcysteine 2485-62-3, L-Cysteine methyl ester 19246-18-5
RL: BAC (Biological activity or effector, except adverse); BIOL (Biological study)
(penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT 52-67-5, D-Penicillamine
RL: BAC (Biological activity or effector, except adverse); RCT (Reactant); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT 52-66-4, D,L-Penicillamine 1113-41-3, L-Penicillamine 7684-18-6D, derivs. 20902-45-8, D-Penicillamine disulfide 72744-87-7
RL: BAC (Biological activity or effector, except adverse); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT **20762-30-5, ADP-ribose**
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT 122-78-1, Phenylacetaldehyde
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT 1074-12-0, Phenylglyoxal
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process)
(penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT 78-98-8, Methylglyoxal
RL: RCT (Reactant)
(penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)

IT 369373-68-2P 369373-69-3P
RL: SPN (Synthetic preparation); PREP (Preparation)
(penicillamines and other .alpha.-amino-.beta.,.beta.-mercapto-.beta.,.beta.-dimethylethane derivs. for treatment of conditions from DNA, protein, or lipid damage)
RE.CNT 3
RE
(1) Anon; Gerontology 1976, V23(2), P77
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(3) Anon; Photochem Photobiol 1988, V48/2, P235

L59 ANSWER 3 OF 8 HCAPLUS COPYRIGHT 2001 ACS
AN 2000:819923 HCAPLUS
DN 134:83865
TI **Histone** carbonylation in vivo and in vitro
AU **Wondrak, Georg T.**; Cervantes-Laurean, Daniel; **Jacobson, Elaine L.**; **Jacobson, Myron K.**
CS College of Pharmacy, University of Kentucky, Lexington, KY, 40506-0286, USA
SO Biochem. J. (2000), 351(3), 769-777
CODEN: BIJOAK; ISSN: 0264-6021
PB Portland Press Ltd.
DT Journal
LA English
CC 13-2 (Mammalian Biochemistry)
AB Non-enzymic damage to nuclear proteins has potentially severe consequences for the maintenance of genomic integrity. Introduction of carbonyl groups into histones in vivo and in vitro was assessed by Western blot immunoassay and reductive incorporation of tritium from radiolabeled NaBH4 (sodium borohydride). **Histone H1** extd. from bovine thymus, liver and spleen was found to contain significantly elevated amts. of protein-bound carbonyl groups as compared with core histones. The carbonyl content of nuclear proteins of rat pheochromocytoma cells (PC12 cells) was not greatly increased following oxidative stress induced by H2O2, but was significantly increased following alkylating stress induced by N-methyl-N'-nitro-N-nitrosoguanidine or by combined oxidative and alkylating stress. Free **ADP-ribose**, a reducing-sugar generated in the nucleus in proportion to DNA strand breaks, was shown to be a potent **histone H1** carbonylating agent in isolated PC12 cell nuclei. Studies of the mechanism of **histone H1** modification by **ADP-ribose** indicate that carbonylation involves formation of a stable acyclic ketoamine. Our results demonstrate preferential **histone H1** carbonylation in vivo, with potentially important consequences for chromatin structure and function.
ST histone carbonylation cell nucleus PC12
IT **Histones**
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(**H1**; histone carbonylation in PC12 cell nuclei)
IT Animal cell line
(PC12; histone carbonylation in PC12 cell nuclei)
IT Ketones, biological studies
RL: BPR (Biological process); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); PROC (Process)
(amino; ketoamine formation in histone carbonylation in PC12 cell nuclei)
IT Carbonylation
Cell nucleus
**Glycation**
Liver
Oxidative stress, biological
Spleen
Thymus gland
(histone carbonylation in PC12 cell nuclei)
IT Histones
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)

(histone carbonylation in PC12 cell nuclei)
IT Amines, biological studies
RL: BPR (Biological process); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); PROC (Process)
(keto; ketoamine formation in histone carbonylation in PC12 cell nuclei)
IT Alkylation
(stress; histone carbonylation in PC12 cell nuclei)
IT **20762-30-5, ADP-ribose**
RL: BPR (Biological process); RCT (Reactant); BIOL (Biological study); PROC (Process)
(histone carbonylation in PC12 cell nuclei)
IT 316383-70-7
RL: BPR (Biological process); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); PROC (Process)
(ketoamine formation in histone carbonylation in PC12 cell nuclei)
IT 316383-67-2
RL: BPR (Biological process); MFM (Metabolic formation); RCT (Reactant); BIOL (Biological study); FORM (Formation, nonpreparative); PROC (Process)
(ketoamine formation in histone carbonylation in PC12 cell nuclei)
IT 1946-82-3, N-Acetyl-L-lysine
RL: BPR (Biological process); RCT (Reactant); BIOL (Biological study); PROC (Process)
(ketoamine formation in histone carbonylation in PC12 cell nuclei)
RE.CNT 41
RE
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L59 ANSWER 4 OF 8 HCAPLUS COPYRIGHT 2001 ACS
AN 2000:720103 HCAPLUS
DN 134:67675
TI Formation of a **protein**-bound pyrazinium free radical cation during **glycation** of **histone H1**
AU **Wondrak, G. T.**; Varadarajan, S.; Butterfield, D. A.; **Jacobson, M. K.**
CS College of Pharmacy, University of Kentucky, Lexington, KY, USA
SO Free Radical Biol. Med. (2000), 29(6), 557-567
CODEN: FRBMEH; ISSN: 0891-5849
PB Elsevier Science Inc.
DT Journal
LA English
CC 6-3 (General Biochemistry)
AB **Glycation**, the nonenzymic reaction between protein amino groups and reducing sugars, induces protein damage that has been linked to several pathol. conditions, esp. diabetes, and general aging. Here we describe the direct identification of a protein-bound free radical formed during early **glycation** of **histone H1** in vitro. Earlier EPR anal. of thermal browning reactions between free amino acids and reducing sugars has implicated the sugar fragmentation product glycolaldehyde in the generation of a 1,4-disubstituted pyrazinium free radical cation. In order to evaluate the potential formation of this radical in vivo, the early **glycation** of BSA, lysozyme, and **histone H1** by several sugars (D-glucose, D-ribose, **ADP-ribose**, glycolaldehyde) under conditions of physiol. pH and temp. was examd. by EPR. The pyrazinium free radical cation was identified on **histone H1 glycated** by glycolaldehyde (g = 2.00539, aN = 8.01 [2N], aH = 5.26 [4H], aH = 2.72 [4H]), or **ADP-ribose**. Reaction of glycoaldehyde with poly-L-lysine produced an identical signal, whereas reaction with BSA or lysozyme produced only a minor unresolved singlet signal. In the absence of oxygen the signal was stable over several days. Our results raise the possibility that pyrazinium radicals may form during **glycation** of **histone H1** in vivo.
ST protein bound pyrazinium radical cation **glycation** **histone H1**
IT **Histones**
RL: BPR (Biological process); PRP (Properties); RCT (Reactant); BIOL (Biological study); PROC (Process)
(**H1**; formation of a protein-bound pyrazinium free radical cation during **glycation** of **histone** H1)
IT Crosslinking
**Glycation**
(formation of a protein-bound pyrazinium free radical cation during **glycation** of **histone H1**)
IT 50-69-1, D-Ribose 141-46-8 **20762-30-5, ADP-ribose**
RL: BPR (Biological process); RCT (Reactant); BIOL (Biological study); PROC (Process)
(formation of a protein-bound pyrazinium free radical cation during **glycation** of **histone H1**)
IT 41927-79-1D, Pyrazine radical cation, protein-bound derivs.
RL: FMU (Formation, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative)
(formation of a protein-bound pyrazinium free radical cation during **glycation** of **histone H1**)
IT 56-87-1, L-Lysine, biological studies 1946-82-3, N.alpha.-Acetyl-L-lysine 25104-18-1, Poly-L-lysine 38000-06-5, Poly-L-lysine
RL: BPR (Biological process); RCT (Reactant); BIOL (Biological study); PROC (Process)
(**glycation**; formation of a protein-bound pyrazinium free radical cation during **glycation** of **histone**

H1)
IT 70-18-8, Glutathione, biological studies
RL: BAC (Biological activity or effector, except adverse); BPR (Biological process); RCT (Reactant); BIOL (Biological study); PROC (Process)
(role as protective agent against protein **glycation**; formation of a protein-bound pyrazinium free radical cation during **glycation** of **histone H1**)
RE.CNT 52
RE
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L59 ANSWER 5 OF 8 HCAPLUS COPYRIGHT 2001 ACS
AN 1997:627780 HCAPLUS
DN 127:304656
TI **ADP-ribose** in **glycation** and

**glycoxidation** reactions

AU **Jacobson, Elaine L.**; Cervantes-Laurean, Daniel; **Jacobson, Myron K.**

CS Department of Clinical Sciences and Division of Medicinal Chemistry and Pharmaceutics, College of Pharmacy, A323A ASTeCC University of Kentucky, Lexington, KY, 40506-0286, USA

SO Adv. Exp. Med. Biol. (1997), 419(ADP-Ribosylation in Animal Tissues), 371-379
CODEN: AEMBAP; ISSN: 0065-2598

PB Plenum

DT Journal

LA English

CC 7-3 (Enzymes)

AB **Glycation** is initiated by reaction of a reducing sugar with a **protein** amino group to generate a Schiff base adduct. Following an Amadori rearrangement to form a ketoamine adduct, a complex chem. involving oxidn. often leads to **protein glycoxidn.** products referred to as **advanced glycosylation end products** (AGE). The AGE include **protein** carboxymethyllysine (CML) residues and a heterogeneous group of complex modifications characterized by high fluorescence and **protein-protein** crosslinks. The sugar sources for the **glycoxidn**. of intracellular **proteins** are not well defined but pentoses have been implicated because they are efficient precursors for the formation of the fluorescent AGE, pentosidine. **ADP-ribose**, generated from NAD by **ADP-ribose** transfer reactions, is a likely intracellular source of a reducing pentose moiety. Incubation of **ADP-ribose** with **histones** results in the formation of ketoamine **glycation** conjugates and also leads to the rapid formation of **protein** CML residues, **histone H1** dimers, and highly fluorescent products with properties similar to the AGE. **ADP-ribose** is much more efficient than other possible pentose donors for **glycation** and **glycoxidn.** of **protein** amino groups. Recently developed methods that differentiate nonenzymic modifications of **proteins** by **ADP-ribose** from enzymic modifications now allow investigations to establish whether some **protein** modifications by monomers of **ADP-ribose** in vivo represent **glycation** and **glycoxidn.**

ST **ADP ribose glycation glycoxidn** protein

IT **Glycation**
(**ADP-ribose** in **glycation** and **glycoxidn.** reactions)

IT Glycoproteins (general), biological studies
**Histone H1**
**Histones**
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(**ADP-ribose** in **glycation** and **glycoxidn.** reactions)

IT **Advanced glycation end products**
RL: MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative)
(**ADP-ribose** in **glycation** and **glycoxidn.** reactions)

IT Oxidation (biological)
(glyco-; **ADP-ribose** in **glycation** and **glycoxidn.** reactions)

IT **20762-30-5, ADP-ribose**
RL: BPR (Biological process); RCT (Reactant); BIOL (Biological study); PROC (Process)
(**ADP-ribose** in **glycation** and **glycoxidn.** reactions)

IT 56-87-1D, L-Lysine, Carboxymethyl derivs.
RL: MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative)

(protein residues; **ADP-ribose** in **glycation** and **glycoxidn.** reactions)

L59 ANSWER 6 OF 8 HCAPLUS COPYRIGHT 2001 ACS
AN 1996:282926 HCAPLUS
DN 124:335954
TI **Glycation** and **glycoxidation** of **histones** by **ADP-ribose**
AU Cervantes-Laurean, Daniel; **Jacobson, Elaine L.**; **Jacobson, Myron K.**
CS Div. Med. Chem. Pharmaceutics, Univ. Kentucky, Lexington, KY, 40536, USA
SO J. Biol. Chem. (1996), 271(18), 10461-10469
CODEN: JBCHA3; ISSN: 0021-9258
DT Journal
LA English
CC 6-3 (General Biochemistry)
AB The reaction of long lived **proteins** with reducing sugars has been implicated in the pathophysiol. of aging and age-related diseases. A likely intranuclear source of reducing sugar is **ADP-ribose**, which is generated following DNA damage from the turnover of **ADP-ribose** polymers. In this study, **ADP-ribose** has been shown to be a potent **histone glycation** and **glycoxidn.** agent in vitro. Incubation of **ADP-ribose** with **histones H1**, H2A, H2B, and H4 at pH 7.4 resulted in the formation of ketoamine **glycation** conjugates. Incubation of **histone H1** with **ADP-ribose** also rapidly resulted in the formation of **protein** carboxymethyllysine residues, **protein-protein** cross-links, and highly fluorescent products with properties similar to the **advanced glycosylation end product** pentosidine. The formation of **glycoxidn.** products was related to the degrdn. of ketoamine **glycation** conjugates by two different pathways. One pathway resulted in the formation of **protein** carboxymethyllysine residues and release of an ADP moiety contg. a glyceric acid fragment. A second pathway resulted in the release of ADP, and it is postulated that this pathway is involved in the formation of **histone-histone** cross-links and fluorescent **advanced glycosylation end products.**
ST **histone glycation glycoxidn ADP ribose**
IT **Histones**
RL: BSU (Biological study, unclassified); RCT (Reactant); BIOL (Biological study)
(**H1**, **glycation** and **glycoxidn.** of **histones** by **ADP-ribose**)
IT **Histones**
RL: BSU (Biological study, unclassified); RCT (Reactant); BIOL (Biological study)
(H2A, **glycation** and **glycoxidn.** of **histones** by **ADP-ribose**)
IT **Histones**
RL: BSU (Biological study, unclassified); RCT (Reactant); BIOL (Biological study)
(H2B, **glycation** and **glycoxidn.** of **histones** by **ADP-ribose**)
IT **Histones**
RL: BSU (Biological study, unclassified); RCT (Reactant); BIOL (Biological study)
(H4, **glycation** and **glycoxidn.** of **histones** by **ADP-ribose**)
IT **Glycosidation**
(**glycation**, **glycation** and **glycoxidn.** of **histones** by **ADP-ribose**)
IT 20762-30-5, **ADP-ribose**
RL: BSU (Biological study, unclassified); RCT (Reactant); BIOL (Biological

study)
(**glycation** and **glycoxidn.** of **histones** by **ADP-ribose**)

L59 ANSWER 7 OF 8 HCAPLUS COPYRIGHT 2001 ACS
AN 1995:233754 HCAPLUS
DN 122:26022
TI **Glycation** of **proteins** by **ADP-ribose**
AU **Jacobson, Elaine L.**; Cervantes-Laurean, Daniel; **Jacobson, Myron K.**
CS College of Allied Health Professions, University of Kentucky, Lexington, KY, 40536, USA
SO Mol. Cell. Biochem. (1994), 138(1/2), 207-12
CODEN: MCBIB8; ISSN: 0300-8177
DT Journal; General Review
LA English
CC 6-0 (General Biochemistry)
AB A review, with 44 refs. Numerous metabolic pathways generate free **ADP-ribose** at many locations within cells. The metabolic fates of this nucleotide are poorly understood and measurement of it in situ is tech. difficult at present. Yet considerable evidence has accumulated implicating that protein **glycation** by **ADP-ribose** can occur. This evidence is reviewed here along with recent developments in characterizing the chem. of this reaction and the application of this information to the identification of this posttranslational modification in protein in situ.
ST review **glycation** protein **ADP ribose**
IT Proteins, biological studies
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(**glycation** of proteins by **ADP-ribose**)
IT **Glycosidation**
(ADP-ribosidation, **glycation** of proteins by **ADP-ribose**)
IT **20762-30-5, ADP ribose**
RL: BPR (Biological process); BIOL (Biological study); PROC (Process)
(**glycation** of proteins by **ADP-ribose**)

L59 ANSWER 8 OF 8 HCAPLUS COPYRIGHT 2001 ACS
AN 1993:213421 HCAPLUS
DN 118:213421
TI **Protein glycation** by **ADP-ribose**: Studies of model conjugates
AU Cervantes-Laurean, Daniel; Minter, David E.; **Jacobson, Elaine L.**; **Jacobson, Myron K.**
CS Texas Coll. Osteopath. Med., Univ. North Texas, Fort Worth, TX, 76107, USA
SO Biochemistry (1993), 32(6), 1528-34
CODEN: BICHAW; ISSN: 0006-2960
DT Journal
LA English
CC 33-9 (Carbohydrates)
Section cross-reference(s): 6, 34
AB The synthesis and characterization of model conjugates for protein **glycation** of lysine residues by **ADP-ribose**, is described. Two stable conjugates derived from **ADP-ribose** and n-butylamine were isolated and characterized. Both conjugates were shown to be keto amines derived from a Schiff base by an Amadori rearrangement. The chem. stability of the keto amines allowed them to be differentiated from all classes of enzymic protein modification by **ADP-ribose**. Further, their chem. properties suggest that a previous report of **histone H1** modification in carcinogen treated cells was due to **glycation** by **ADP-ribose**.
ST protein **glycation ADP ribose**; keto amine ADP prepn oximation
IT Proteins, reactions
RL: RCT (Reactant)

(**glycation** of lysine residues in, with **ADP-ribose**, model conjugates for)
IT **Glycosidation**
(**glycation**, of proteins with **ADP-ribose**, model conjugates for)
IT 109-73-9, 1-Butanamine, reactions
RL: RCT (Reactant)
(condensation of, with ADP)
IT **20762-30-5P**
RL: SPN (Synthetic preparation); PREP (Preparation)
(model conjugates for protein **glycation** by, prepn. of)
IT 146919-58-6P 147071-32-7P
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
(prepn. and NMR of)
IT 146919-61-1P 147369-21-9P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation)
(prepn., oximation, and NMR of)

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L89 ANSWER 1 OF 6 MEDLINE
AN 2001031037 MEDLINE
DN 20480718 PubMed ID: 11025199
TI Formation of a protein-bound pyrazinium free radical cation during **glycation** of **histone H1**.
AU **Wondrak G T**; Varadarajan S; Butterfield D A; **Jacobson M K**
CS College of Pharmacy, University of Kentucky, Lexington, KY 40506-0055, USA.
NC CA43894 (NCI)
NS38496 (NINDS)
SO FREE RADICAL BIOLOGY AND MEDICINE, (2000 Sep 15) 29 (6) 557-67.
Journal code: FRE. ISSN: 0891-5849.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 200011
ED Entered STN: 20010322
Last Updated on STN: 20010322

Entered Medline: 20001117

AB **Glycation**, the nonenzymatic reaction between protein amino groups and reducing sugars, induces protein damage that has been linked to several pathological conditions, especially diabetes, and general aging. Here we describe the direct identification of a protein-bound free radical formed during early **glycation** of **histone H1** in vitro. Earlier EPR analysis of thermal browning reactions between free amino acids and reducing sugars has implicated the sugar fragmentation product glycolaldehyde in the generation of a 1,4-disubstituted pyrazinium free radical cation. In order to evaluate the potential formation of this radical in vivo, the early **glycation** of BSA, lysozyme, and **histone H1** by several sugars (D-glucose, D-ribose, **ADP-ribose**, glycolaldehyde) under conditions of physiological pH and temperature was examined by EPR. The pyrazinium free radical cation was identified on **histone H1** **glycated** by glycolaldehyde (g = 2.00539, aN = 8.01 [2N], aH = 5.26 [4H], aH = 2.72 [4H]), or **ADP-ribose**. Reaction of glycoaldehyde with poly-L-lysine produced an identical signal, whereas reaction with BSA or lysozyme produced only a minor unresolved singlet signal. In the absence of oxygen the signal was stable over several days. Our results raise the possibility that pyrazinium radicals may form during **glycation** of **histone H1** in vivo.

CT Check Tags: Animal; Support, U.S. Gov't, P.H.S.
Acetaldehyde: AA, analogs & derivatives
Acetaldehyde: ME, metabolism
**Adenosine Diphosphate Ribose: ME, metabolism**
Antioxidants: PD, pharmacology
Cations
Cattle
Cross-Linking Reagents: ME, metabolism
Electron Spin Resonance Spectroscopy
Free Radicals: CH, chemistry
*Free Radicals: ME, metabolism
Glutathione: AA, analogs & derivatives
Glutathione: ME, metabolism
**Glycosylation: DE, drug effects**
**Histones: CH, chemistry**
***Histones: ME, metabolism**
Hydrogen-Ion Concentration
Lysine: AA, analogs & derivatives
Lysine: ME, metabolism
Maillard Reaction
Polylysine: ME, metabolism
Pyrazines: CH, chemistry
*Pyrazines: ME, metabolism
Ribose: ME, metabolism

RN 141-46-8 (glycolaldehyde); 1946-82-3 (N(alpha)-acetyllysine); **20762-30-5 (Adenosine Diphosphate Ribose)**; 25104-18-1 (Polylysine); 50-69-1 (Ribose); 56-87-1 (Lysine); 70-18-8 (Glutathione); 75-07-0 (Acetaldehyde)

CN 0 (Antioxidants); 0 (Cations); 0 (Cross-Linking Reagents); 0 (Free Radicals); 0 (**Histones**); 0 (Pyrazines)

L89 ANSWER 2 OF 6 MEDLINE
AN 97336932 MEDLINE
DN 97336932 PubMed ID: 9193679
TI **ADP-ribose** in **glycation** and **glycoxidation** reactions.
AU **Jacobson E L**; Cervantes-Laurean D; **Jacobson M K**
CS Department of Clinical Sciences, College of Pharmacy, University of Kentucky, Lexington 40506-0286, USA.
NC CA43894 (NCI)
SO ADVANCES IN EXPERIMENTAL MEDICINE AND BIOLOGY, (1997) 419 371-9. Ref: 24
Journal code: 2LU; 0121103. ISSN: 0065-2598.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)

General Review; (REVIEW)
(REVIEW, TUTORIAL)
LA English
FS Priority Journals
EM 199709
ED Entered STN: 19970916
Last Updated on STN: 19970916
Entered Medline: 19970904
AB **Glycation** is initiated by reaction of a reducing sugar with a **protein** amino group to generate a Schiff base adduct. Following an Amadori rearrangement to form a ketoamine adduct, a complex chemistry involving oxidation often leads to **protein glycoxidation** products referred to as **advanced glycosylation end products** (AGE). The AGE include **protein** carboxymethyllysine (CML) residues and a heterogeneous group of complex modifications characterized by high fluorescence and **protein-protein** cross links. The sugar sources for the **glycoxidation** of intracellular **proteins** are not well defined but pentoses have been implicated because they are efficient precursors for the formation of the fluorescent AGE, pentosidine. **ADP-ribose**, generated from NAD by **ADP-ribose** transfer reactions, is a likely intracellular source of a reducing pentose moiety. Incubation of **ADP-ribose** with **histones** results in the formation of ketoamine **glycation** conjugates and also leads to the rapid formation of **protein** CML residues, **histone H1** dimers, and highly fluorescent products with properties similar to the AGE. **ADP-ribose** is much more efficient than other possible pentose donors for **glycation** and **glycoxidation** of **protein** amino groups. Recently developed methods that differentiate nonenzymic modifications of **proteins** by **ADP-ribose** from enzymic modifications now allow investigations to establish whether some **protein** modifications by monomers of **ADP-ribose** in vivo represent **glycation** and **glycoxidation**.
CT Check Tags: Human; Support, U.S. Gov't, P.H.S.
***Adenosine Diphosphate Ribose: ME, metabolism**
Arginine: ME, metabolism
Fluorescence
**Glycosylation**
**Glycosylation End Products, Advanced: ME, metabolism**
Hexosamines: ME, metabolism
**Histones: ME, metabolism**
Ketoses: ME, metabolism
Lysine: ME, metabolism
Oxidation-Reduction
RN **20762-30-5 (Adenosine Diphosphate Ribose)**; 56-87-1 (Lysine); 7004-12-8 (Arginine)
CN 0 (**Glycosylation** End Products, Advanced); 0 (Hexosamines); 0 (**Histones**); 0 (Ketoses)

L89 ANSWER 3 OF 6 MEDLINE
AN 96291622 MEDLINE
DN 96291622 PubMed ID: 8726360
TI Decreased heterogeneity of CS **histone** variants after hydrolysis of the **ADP-ribose** moiety.
AU Imschenetzky M; Morin V; Carvajal N; Montecino M; Puchi M
CS Department of Molecular Biology, Universidad de Concepcion, Chile.
SO JOURNAL OF CELLULAR BIOCHEMISTRY, (1996 Apr) 61 (1) 109-17.
Journal code: HNF; 8205768. ISSN: 0730-2312.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 199610
ED Entered STN: 19961025
Last Updated on STN: 19980206

Entered Medline: 19961015

AB Sea urchin CS **histone** variants are electrophoretically heterogeneous when analyzed in two dimensional polyacrylamide gels (2D-PAGE). Previous results suggested that this heterogeneity is due to the poly (ADP-ribosylation) of these proteins. Consequently, native CS **histone** variants were subjected to different treatments to remove the **ADP-ribose** moiety. The incubation in 1 M hydroxylamine was not effective in eliminating the polymers of **ADP -ribose** from CS variants, and the treatment with sodium hydroxide was deleterious to the proteins. In contrast, the **ADP-ribose** moiety was successfully removed from the CS variants by incubation with phosphodiesterase (PDE). To eliminate contamination of CS **histone** variants with PDE extract, the enzyme was covalently bound to Sepharose 4B prior to its utilization. Treatment of native CS **histone** variants with this immobilized phosphodiesterase removed around 85% of the total **ADP-ribose** moiety from these proteins. After S-PDE treatment the complex electrophoretic pattern of CS **histone** variants in 2-D PAGE decreases to five major fractions. From these results we conclude that the electrophoretic heterogeneity of native CS **histone** variants is mainly due to the extent to which five main CS **histone** variants are poly(ADP)-ribosylated).

CT Check Tags: Animal; Female; Male; Support, Non-U.S. Gov't
***Adenosine Diphosphate Ribose: ME, metabolism**
Blotting, Western
Cleavage Stage, Ovum
Dansyl Compounds: PD, pharmacology
Electrophoresis, Polyacrylamide Gel
Fluorescent Dyes
**Glycosylation: DE, drug effects**
***Histones: ME, metabolism**
Hydrazines: PD, pharmacology
Hydrolysis
Hydroxylamine
Hydroxylamines: PD, pharmacology
Periodic Acid: PD, pharmacology
Phosphoric Diester Hydrolases: PD, pharmacology
**Poly Adenosine Diphosphate Ribose: AN, analysis**
Sea Urchins
Sodium Hydroxide: PD, pharmacology
Variation (Genetics)

RN 10450-60-9 (Periodic Acid); 1310-73-2 (Sodium Hydroxide); **20762-30-5 (Adenosine Diphosphate Ribose)**; **26656-46-2 (Poly Adenosine Diphosphate Ribose)**; 33008-06-9 (dansyl hydrazine); 7803-49-8 (Hydroxylamine)

CN 0 (Dansyl Compounds); 0 (Fluorescent Dyes); 0 (**Histones**); 0 (Hydrazines); 0 (Hydroxylamines); EC 3.1.4 (Phosphoric Diester Hydrolases); EC 3.1.4.1 (phosphodiesterase I)

L89 ANSWER 4 OF 6 MEDLINE
AN 96209963 MEDLINE
DN 96209963 PubMed ID: 8631841
TI **Glycation** and **glycoxidation** of **histones** by **ADP-ribose.**
AU Cervantes-Laurean D; **Jacobson E L**; **Jacobson M K**
CS Division of Medicinal Chemistry and Pharmaceutics, College of Pharmacy, University of Kentucky, Lexington 40536, USA.
NC CA43894 (NCI)
SO JOURNAL OF BIOLOGICAL CHEMISTRY, (1996 May 3) 271 (18) 10461-9.
Journal code: HIV; 2985121R. ISSN: 0021-9258.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 199607
ED Entered STN: 19960715
Last Updated on STN: 19960715

Entered Medline: 19960701

AB The reaction of long lived **proteins** with reducing sugars has been implicated in the pathophysiology of aging and age-related diseases. A likely intranuclear source of reducing sugar is **ADP-ribose**, which is generated following DNA damage from the turnover of **ADP-ribose** polymers. In this study, **ADP-ribose** has been shown to be a potent **histone glycation** and **glycoxidation** agent in vitro. Incubation of **ADP-ribose** with **histones H1**, H2A, H2B, and H4 at pH 7.5 resulted in the formation of ketoamine **glycation** conjugates. Incubation of **histone H1** with **ADP-ribose** also rapidly resulted in the formation of **protein** carboxymethyllysine residues, **protein-protein** cross-links, and highly fluorescent products with properties similar to the **advanced glycosylation end product** pentosidine. The formation of **glycoxidation** products was related to the degradation of ketoamine **glycation** conjugates by two different pathways. One pathway resulted in the formation of **protein** carboxymethyllysine residues and release of an ADP moiety containing a glyceric acid fragment. A second pathway resulted in the release of ADP, and it is postulated that this pathway is involved in the formation of **histone-histone** cross-links and fluorescent **advanced glycosylation end products.**

CT Check Tags: Human; Support, U.S. Gov't, P.H.S.
***Adenosine Diphosphate Ribose: CH, chemistry**
Fluorescence
*Glucose: CH, chemistry
***Histones: ME, metabolism**
Magnetic Resonance Spectroscopy

RN **20762-30-5 (Adenosine Diphosphate Ribose)**; 50-99-7 (Glucose)

CN 0 (**Histones**)

L89 ANSWER 5 OF 6 MEDLINE

AN 93160190 MEDLINE

DN 93160190 PubMed ID: 8431431

TI Protein **glycation** by **ADP-ribose**: studies of model conjugates.

AU Cervantes-Laurean D; Minter D E; **Jacobson E L**; **Jacobson M K**

CS Department of Biochemistry and Molecular Biology, Texas College of Osteopathic Medicine, University of North Texas, Fort Worth 76107.

NC CA43894 (NCI)

SO BIOCHEMISTRY, (1993 Feb 16) 32 (6) 1528-34.
Journal code: A0G; 0370623. ISSN: 0006-2960.

CY United States

DT Journal; Article; (JOURNAL ARTICLE)

LA English

FS Priority Journals

EM 199303

ED Entered STN: 19930402
Last Updated on STN: 19970203
Entered Medline: 19930315

AB Protein **glycation** by hexoses has been implicated in the pathophysiology of a number of diseases as well as the aging process. Studies of **ADP-ribose** polymer metabolism have shown that free **ADP-ribose** is generated at high rates in the cell nucleus following DNA damage. Protein **glycation** by **ADP-ribose** has been reported although the chemistry is not understood. Described here is the synthesis and characterization of model conjugates for protein **glycation** of lysine residues by **ADP-ribose**. Two stable conjugates derived from **ADP-ribose** and n-butylamine were isolated and characterized. Both conjugates were shown to be ketoamines derived from a Schiff base by an Amadori rearrangement. The chemical stability of the ketamines allowed them to be differentiated from all classes of enzymic

protein modification by **ADP-ribose**. Further, their chemical properties suggest that a previous report of **histone H1** modification in carcinogen treated cells was due to **glycation** by **ADP-ribose**.

CT Check Tags: Support, U.S. Gov't, Non-P.H.S.; Support, U.S. Gov't, P.H.S.
***Adenosine Diphosphate Ribose: CH, chemistry**
***Adenosine Diphosphate Ribose: ME, metabolism**
*Amines
Colorimetry
*Glycoproteins: ME, metabolism
**Glycosylation**
Indicators and Reagents
Kinetics
*Lysine
Magnetic Resonance Spectroscopy
Models, Chemical
Proteins: ME, metabolism
Time Factors

RN **20762-30-5 (Adenosine Diphosphate Ribose)**; 56-87-1 (Lysine)
CN 0 (Amines); 0 (Glycoproteins); 0 (Indicators and Reagents); 0 (Proteins)

L89 ANSWER 6 OF 6 MEDLINE
AN 83127216 MEDLINE
DN 83127216 PubMed ID: 6824639
TI **Glycosylation**, ADP-ribosylation, and methylation of Tetrahymena **histones**.
AU Levy-Wilson B
SO BIOCHEMISTRY, (1983 Jan 18) 22 (2) 484-9.
Journal code: A0G; 0370623. ISSN: 0006-2960.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 198304
ED Entered STN: 19900318
Last Updated on STN: 19900318
Entered Medline: 19830421
AB We have examined some of the postsynthetic modifications that occur in macronuclear **histones** from Tetrahymena thermophila. When purified macronuclei are incubated with [32P]NAD+, **histones H1**, H2A, H2B, and H3 are ADP-ribosylated. Furthermore, **histones H1**, H2A, H2B, and H3 contain fucose and mannose residues as evidenced by the incorporation of [3H]fucose and by the specific binding to these proteins of gorse seed lectin and concanavalin A. Finally, our studies on incorporation of methyl groups into **histones** show that **histone H2A**, together with the related nonhistone protein A24, is methylated in Tetrahymena.
CT Check Tags: Animal; Support, U.S. Gov't, P.H.S.
***Adenosine Diphosphate Ribose: ME, metabolism**
Cell Nucleus: AN, analysis
Concanavalin A: ME, metabolism
*Fucose: ME, metabolism
***Histones: ME, metabolism**
Lectins
Mannose: ME, metabolism
Methylation
*Nucleoside Diphosphate Sugars: ME, metabolism
*Tetrahymena: AN, analysis
RN 11028-71-0 (Concanavalin A); **20762-30-5 (Adenosine Diphosphate Ribose)**; 31103-86-3 (Mannose); 3713-31-3 (Fucose)
CN 0 (**Histones**); 0 (Lectins); 0 (Nucleoside Diphosphate Sugars); 0 (gorse agglutinin)

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L92 ANSWER 1 OF 1 BIOTECHDS COPYRIGHT 2001 DERWENT INFORMATION LTD
AN 1993-05806 BIOTECHDS
TI A new approach for the synthesis of affinity resins: enzymatic synthesis of **poly(ADP-ribose)**-agarose beads;
**poly-ADP-ribose**-agarose bead adsorbent production using NAD-ADP-ribosyltransferase (conference abstract)
AU Panzeter P L; Zweifel B; Althaus F R
LO Institute of Pharmacology and Biochemistry, University of Zuerich, CH-8057 Zuerich, Switzerland.
SO J.Cell.Biochem.; (1993) Suppl.17A, 50
CODEN: JCEBD5
DT Journal
LA English
AB A **poly-ADP-ribose**-agarose affinity resin was produced by an enzymatic approach, using **poly-ADP-ribose**-polymerase (NAD-ADP-ribosyltransferase, EC-2.4.2.30) and NAD+- or (**ADP-ribose**)-agarose beads. Both resins were recognized as acceptors by the enzyme, which elongated the existing ligands to form polymers closely resembling those modifying proteins. Addition of **ADP-ribose** residues depended on enzyme activity, time of incubation, the concentration of free NAD+ available as a substrate, the amount of derivatized agarose, and the chemical moiety through which the ligand was linked to the agarose. Fractionation of rat liver nuclear lysate over the **poly-ADP-ribose** resin revealed a strong affinity of **histone H1** for **ADP-ribose** polymers. This resin could also be used to purify the catabolic analog of **poly-ADP-ribose**-polymerase, **poly-ADP-ribose**-glycohydrolase, and to study polymer-binding proteins from other species. Such an enzymatic approach to synthesizing affinity resins, when possible, could improve binding efficiencies and capacities by optimizing ligand orientation. (0 ref)
CC H OTHER CHEMICALS; H1 Polymers; L PURIFICATION; L1 Downstream Processing; K BIOCATALYSIS; K2 Application
CT **POLY-ADP-RIBOSE**-AGAROSE BEAD PREP., NAD-ADP-RIBOSYLTRANSFERASE, APPL. ADSORBENT, AFFINITY CHROMATOGRAPHY PROTEIN PURIFICATION POLYMER HET-N RING-5 RING-6 COND.RING AMINE NUCLEOTIDE SUGAR ENZYME EC-2.4.2.30

=> fil wpix
FILE 'WPIX' ENTERED AT 14:56:38 ON 19 DEC 2001


FILE LAST UPDATED: 17 DEC 2001 <20011217/UP>
MOST RECENT DERWENT UPDATE 200174 <200174/DW>
DERWENT WORLD PATENTS INDEX SUBSCRIBER FILE, COVERS 1963 TO DATE

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http://www.derwent.com/chemistryresource/index.html <<<

>>> FOR DETAILS OF THE PATENTS COVERED IN CURRENT UPDATES,
SEE http://www.derwent.com/dwpi/updates/dwpicov/index.html <<<

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L105 ANSWER 1 OF 1 WPIX COPYRIGHT 2001 DERWENT INFORMATION LTD
AN 2000-339763 [29] WPIX
DNN N2000-255026 DNC C2000-103203
TI Detecting **poly(ADP-ribose** polymerase) activity useful for identifying inhibitors or activators of the enzyme uses specific antibodies to detect **poly(ADP-ribose**) product.
DC B04 D16 S03
IN DE MURCIA, G; DECKER, P; MULLER, S
PA (CNRS) CNRS CENT NAT RECH SCI; (CNRS) CENT NAT RECH SCI
CYC 21
PI WO 2000023804 A1 20000427 (200029)* FR 37p G01N033-573 <--
RW: AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE
W: CA JP US
FR 2785053 A1 20000428 (200029) G01N033-573 <--
ADT WO 2000023804 A1 WO 1999-FR2456 19991012; FR 2785053 A1 FR 1998-13211 19981021
PRAI FR 1998-13211 19981021
IC ICM **G01N033-573**
ICS C12Q001-48; G01N033-544
AB WO 200023804 A UPAB: 20000617
NOVELTY - Detection of **poly(ADP-ribose** polymerase) (PARP) (I) activity, is new and comprises detecting binding between (I) and **poly(ADP-ribose**) (II), using an antibody (Ab) specific for (II).
DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a kit for detecting (I) comprising PARP, at least one Ab, media and buffers required for:
(i) adsorption of (II) on an ELISA (enzyme-linked immunosorbant assay) support;
(ii) detection of Ab; and
(iii) formation of Ab-(II) complex;
and optionally a second antibody (Ab2), optionally labeled with enzyme, that forms a complex with Ab, a substrate for the enzyme, chromogen and stop reagent, media and buffers for the Ab-Ab2 reaction, and an inhibitor or activator of (I) as internal standard.
USE - The method is useful for detecting (I), and particularly for identifying agents that inhibit or activate the activity of (I) (claimed).
ADVANTAGE - The method is simple, rapid, specific and extremely sensitive (allowing detection of modulators at the nanomolar level) and it does not require use of radioactive labels.
Dwg.0/5
FS CPI EPI
FA AB; DCN
MC CPI: B04-B03B; B04-D01; B04-G21; B04-G22; B04-L04A; B11-C07A4; B11-C07B1; B12-K04; B12-K04E; D05-H09; D05-H10; D05-H11A; D05-H11B; D05-H12; D05-H18
EPI: S03-E14H4
TECH UPTX: 20000617
TECHNOLOGY FOCUS - BIOLOGY - Preferred Method: To detect an inhibitor/activator of (I), the new method is used to measure activity of (I) in the presence and absence of a test compound (present at less than 250, especially 25-200, nM) and the results compared. Preferably, (I) is adsorbed on to a support (particularly a plastic microtiter plate), then treated with a reaction medium containing the components necessary for (I) activity, resulting in formation of (II) and binding of (II) to at least one nuclear acceptor protein (present in the medium or adsorbed). A medium containing Ab is then added to form a complex with (II) bound to (I) and this complex is detected and (I) activity measured. The first medium added

may also include a test compound. Adsorption of (I) is from a medium that contains a compound (A) that can act as screen between damaged DNA and (A) and a compound (B) that promotes formation of zinc fingers. The first medium contains a substrate for (I) (specifically oxidized beta-nicotinamide-adenine dinucleotide, NAD), a (I) co-factor (specifically damaged DNA), a reducing agent (specifically dithiothreitol, DTT), (A) and (B). Ab is added after dilution with medium that prevents non-specific reactions, particularly one containing bovine serum albumin (BSA). Complex formation is determined using a second antibody (Ab2) coupled to an enzyme and the binding of Ab and Ab2 is detected by colorimetry, after adding an enzyme substrate, especially tetramethylbenzidine and hydrogen peroxide. Preferred reaction mixtures contain 0.2 - 0.6 mug/ml (I); 1-15 mug/ml damaged DNA; 10-30 muM zinc chloride; 3-5 mM magnesium chloride; 25-75 mM oxidized NAD; 0.8-1.2 mM DTT; Ab at a dilution of 1/500-1/2000; and BSA at 0.2-0.6 wt.-vol.%. Preferred Materials: The nuclear acceptor is particularly (I) but may also be a **histone**, high mobility group protein, topoisomerase, DNA polymerase or DNA ligase. (A) is spermine, spermidine or preferably magnesium chloride, and (B) is zinc chloride. Ab may be commercial mono- or polyclonal antibodies.

=> d his

(FILE 'HOME' ENTERED AT 14:10:17 ON 19 DEC 2001)
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FILE 'REGISTRY' ENTERED AT 14:10:30 ON 19 DEC 2001
E HISTONE/CN
E HISTONE H1/CN
L1 137 S HISTONE H1
L2 123 S L1 AND HISTONE/INS.HP
L3 14 S L1 NOT L2
L4 5 S L3 NOT (GENE OR DNA)
L5 4 S L4 NOT SQL/FA
L6 0 S L2 NOT SQL/FA
E ADP-RIBOSE/CN
E ADP RIBOSE/CN
L7 1 S E3
SEL RN
L8 3 S E1/CRN
E AMINOGUANIDINE/CN
L9 1 S E3
SEL RN
L10 133 S E1/CRN
L11 40 S L10 NOT COMPD
L12 32 S L11 NOT (IDS OR MXS)/CI
L13 4 S L12 AND (CLH OR HI)
L14 129 S L10 NOT L13

FILE 'HCAPLUS' ENTERED AT 14:18:00 ON 19 DEC 2001
L15 714 S L5
L16 4333 S HISTONE H1

FILE 'REGISTRY' ENTERED AT 14:18:33 ON 19 DEC 2001
L17 133 S L1 NOT L5

FILE 'HCAPLUS' ENTERED AT 14:18:38 ON 19 DEC 2001
L18 428 S L17
L19 5016 S L15,L16,L18
E HISTONE/CT
L20 252 S E7
E E7+ALL
L21 2401 S E2
L22 5016 S L19,L20
L23 1210 S L7,L8

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L24       5267 S ADP RIBOSE
L25       3764 S POLY ADP RIBOSE
L26        924 S ADPRIBOSE OR POLYADPRIBOSE OR POLYADP RIBOSE OR POLY ADPRIBOS
L27       5542 S L23-L26
L28        169 S L22 AND L27
L29        705 S PROTEIN(L)ADVANC?(L)(ENDPRODUCT OR END PRODUCT)(L)GLYCAT?
L30       1237 S ?PROTEIN?(L)ADVANC?(L)(ENDPRODUCT OR END PRODUCT)(L)(GLYCAT?
L31          4 S L29,L30 AND L28
               E ADVANCED GLYCATION END PRODUCT/CT
               E E4+ALL
L32        907 S E1,E2
               E ADVANCED GLYCATION END PRODUCT/CT
               E E9+ALL
L33        648 S E1,E2
L34          3 S L32,L33 AND L28
L35          4 S L31,L34
L36          4 S HISTONE AND L27 AND L29,L30,L32,L33
L37          4 S L35,L36
               E JACOBSON E/AU
L38        101 S E3,E11,E21-E23
               E JACOBSON M/AU
L39         80 S E3,E11
               E JACOBSON MYRON/AU
L40        113 S E3-E5
               E WONDRAK G/AU
L41         15 S E3-E7
L42          4 S L38-L41 AND L37
L43          4 S L38-L41 AND L29,L30,L32,L33
L44         22 S L38-L41 AND (GLYCAT? OR GLYCOSYLAT? OR GLYCOSIDAT?)
L45          7 S L38-L41 AND L22
L46         89 S L38-L41 AND L27
L47         18 S L46 AND L44,L45
L48         87 S L28-L41 AND GLYCOXIDAT?
L49          2 S L48 AND L44,L45
L50         18 S L47,L49
L51          4 S L43 AND L50
L52         18 S L44,L45,L47,L49,L50 NOT L51
L53          3 S L52 AND (PROTEIN AND GLYCATION)/TI
L54          2 S L52 AND HISTONE/TI
L55          8 S L51,L53,L54
               SEL HIT RN

     FILE 'REGISTRY' ENTERED AT 14:31:46 ON 19 DEC 2001
L56          1 S E1

     FILE 'HCAPLUS' ENTERED AT 14:31:52 ON 19 DEC 2001
L57          2 S L55 AND (L9 OR AMINOGUANIDINE OR AMINO GUANIDINE)
L58          0 S L1 AND L55
L59          8 S L55,L57

     FILE 'REGISTRY' ENTERED AT 14:32:55 ON 19 DEC 2001
L60          5 S L56,L8,L9

     FILE 'REGISTRY' ENTERED AT 14:33:43 ON 19 DEC 2001

     FILE 'HCAPLUS' ENTERED AT 14:33:52 ON 19 DEC 2001
               E NIADYNE/PA,CS
L61          6 S E3-E10
L62          4 S L61 NOT L59

     FILE 'BIOSIS' ENTERED AT 14:36:05 ON 19 DEC 2001
L63       3261 S L1 OR HISTONE H1
L64      22039 S HISTONE
L65       3938 S HISTONE(L)H1
L66        946 S HISTONE(L)H 1
L67      22250 S L63-L66
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L68      5242 S L27
L69       357 S L67 AND L68
L70       853 S L29 OR L30
L71     34202 S GLYCAT? OR GLYCOXIDAT? OR GLYCOSYLAT? OR GLYCOSIDAT?
L72         1 S L69 AND L70
L73         4 S L69 AND L71
L74         4 S L72,L73

     FILE 'HCAPLUS, BIOSIS' ENTERED AT 14:38:55 ON 19 DEC 2001
L75         8 DUP REM L59 L74 (4 DUPLICATES REMOVED)

     FILE 'MEDLINE' ENTERED AT 14:39:01 ON 19 DEC 2001
L76     21423 S L67
              E  HISTONE/CT
              E E19+ALL
              E E2+ALL
L77     12880 S E9+NT
L78     21423 S E12-E21/BI
L79     21423 S L76-L78
L80      5772 S L27
L81      3279 S ADENOSINE DIPHOSPHATE RIBOSE
L82       405 S L79 AND L80,L81
L83     35800 S L70,L71
L84         6 S L82 AND L83
              E GLYCOSYLATION END PRODUCTS/CT
              E E4+ALL
L85      1047 S E3+NT
L86         1 S L82 AND L85
L87         6 S L84,L86
L88         4 S L87 AND (JACOBSON ? OR WONDRAK ?)/AU
L89         6 S L87,L88

     FILE 'MEDLINE' ENTERED AT 14:46:36 ON 19 DEC 2001

     FILE 'BIOTECHDS' ENTERED AT 14:47:18 ON 19 DEC 2001
L90       238 S L64-L66
L91        42 S L24-L26,L81
L92         1 S L90 AND L91

     FILE 'BIOTECHDS' ENTERED AT 14:48:30 ON 19 DEC 2001

     FILE 'BIOTECHNO' ENTERED AT 14:48:50 ON 19 DEC 2001
L93      7422 S L90
L94      1874 S L91
L95       119 S L93 AND L94
L96     15358 S L83
L97       119 S (L93 OR HISTONE) AND L94
L98         2 S L97 AND L96

     FILE 'WPIX' ENTERED AT 14:53:45 ON 19 DEC 2001
              E HISTON
L99       326 S E3-E8
L100      118 S L24-L26,L81
L101       13 S POLY()L81
L102        3 S  L100,L101 AND L99
L103        0 S L102 AND L71
L104        0 S L102 AND L29,L30
L105        1 S L102 AND G01N/ICM

     FILE 'WPIX' ENTERED AT 14:56:38 ON 19 DEC 2001
              E US2000-197829/AP,PRN
              E JACOBSON E/AU
L106       23 S E3,E9
              E JACOBSON M/AU
L107       35 S E3,E11
              E WONDRAK G/AU
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E WO2001079842/PN
L108 0 S L106,L107 AND L99-L101